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**SOME OBSERVATIONS ON A METHOD OF
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So much has been written during the last few years, both in this country and abroad, concerning the amœbæ dysenteriae, and so general is growing the belief that they are the main causative factors in the production of certain very important pathologic processes, that every fact connected with their life-history becomes of interest and possibly of importance. Notwithstanding the numerous studies of these organisms that have been recorded, no direct observations, so far as I am aware, have been published concerning any method of reproduction. It is true that Kartulis succeeded in cultivating them in alkaline straw-infusions, and has described non-motile granular bodies that he supposed were spores; but, so far as I am able to learn, this was a mere inference based on no positive evidence. As other members of this group frequently multiply by direct division it naturally suggests itself that the same would also occur with these, but the failure heretofore to observe this seemed to indicate that if such is actually the case it must be of rare occurrence or does not happen out of the body at all.



During the last three years I have very frequently studied these organisms, and, although indications of reproduction were always watched for, never did I meet with more than a suggestion of this until July 16, 1894, when, while examining the fecal discharge from a patient who had relapsed two weeks before from what was apparently a complete recovery from the chronic form of amebic dysentery; I noticed a large ameba lying in the situation shown in Fig. 1, *a*.

FIG. 1.



Showing triple division. *a*. When first seen. *b*. After segmentation. *c*. Amebæ, with small and very unusual pseudopodia. *d*. One hour after division.

The main body of the ameba was elongated to many times its width and clubbed at either extremity. The lower portion of the body moved down the field more rapidly than the upper, causing a constriction near the middle, which progressively grew smaller and smaller; there had been apparently a pseudopod sent out, and following this, a constriction

between its distal end and the body of the ameba, so that, when first seen there was a small band, not wider than $1\ \mu$, but of considerable length, connecting the two bodies; this band was composed entirely of ectosarc. In perhaps half a minute after the ameba was first seen the thin ectosarc-rod joining the pseudopod with the main body parted near the middle, the ends becoming immediately rounded, and being drawn back rather quickly into the larger masses to which they were respectively attached; a few seconds later the body of the ameba divided at the point of greatest constriction, the ends being at first irregular, but becoming quickly covered over by the ectosarc. Even until division occurred the narrowest point of the body was 4 or 5 μ wide, and the ectosarc was continuous through the center. The two bodies produced by this separation, as the body previously liberated had done, at once became more or less rounded, moved, threw out pseudopodia, and in both movement and appearance in every way resembled ordinary amebæ.

In Fig. 1, *b*, are shown the relative position and form of the organisms about three minutes after segmentation. They seemed to retain but little vitality after division had been completed, which was possibly due to the fact that they had been passed several hours before and were examined at the temperature of the room; the weather, however, was very warm. Notwithstanding that there was but little progressive movement, for a time two of the amebæ sent out many pseudopodia, the character of some of which was very peculiar and like none I had before seen; the peculiarity referred to was

first noticed in the ameba resulting from the pseudopod about five minutes after separation, and consisted in the protrusion of pseudopodia composed entirely of ectosarc, of a uniform diameter of about $2\ \mu$, of a length about equal to the diameter of the body of the ameba, rounded at the extremity and sometimes straight, but usually bent at one or two points; they moved slowly from side to side, occasionally lying full length upon the surface of the ameba. After a time they were retracted, except in one instance, when, while lying upon the ameba, fusion took place between the two. From the larger of the two other amebæ similar slender processes were projected, never quite so long as in the other, but often many were thrown out simultaneously, as shown in Fig. 1, *c*; those coming out in near proximity gave a strong resemblance to the villous processes that occur in other varieties of amebæ. Their movements forcibly suggested that their object was the inclusion of food-materials. The large pseudopodia were in every way like those found in other amebæ. The remaining ameba became quiescent immediately after division and gave off no pseudopodia. Their appearance after one hour is shown in Fig. 1, *d*.

No further examination of the feces was made on this day, the foregoing being regarded merely as a chance-observation, not likely soon to be repeated.

Two days later the discharges were again examined, with the result that several amebæ were seen to divide into two. No other examples of the triple division were seen. In Fig. 2, *a—c*, is shown the type of division as generally observed. The

body of the ameba elongates, a constriction results somewhere about midway between the two ends, and increases until a mere filament of ectosarc remains, which suddenly snaps asunder. Occasionally variations occur, as in Fig. 3. When first seen the ameba was lying as shown at *a*, clubbed

FIG. 2.

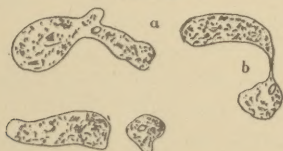
*a-c.* Showing usual method of division.

FIG. 3.

*a-c.* Showing unusual form of segmentation; the middle portion, instead of breaking, slowly fades from view.

at the ends, somewhat constricted toward the middle, and seemed to be perfectly immovable; however, after some minutes slight alterations in form could be detected, and a narrowing of the intermediate portion, with a movement which was so slight that it was at no time perceptible; the connecting

band became smaller and smaller, until it gradually faded from view. The two amebæ resulting scarcely moved after division had been completed.

On the 19th of July division was again observed, but two days later, although the organisms were quite active, the most careful examination failed to show anything of the kind. The patient died on the following day. Unfortunately, no post-mortem examination could be obtained.

It should be stated, in conclusion, that the amebæ from the stools of this patient were, some months before, examined very frequently for a period of over two months, and although they were quite active and very numerous, at no time was the slightest evidence of multiplication seen. The organisms here could in no way be distinguished from those which I have examined from other cases of amebic dysentery, and, with the exception of the related peculiarities, conformed in every particular to the descriptions of the best authorities.

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